

A

Course of Mechanical

A N D

Experimental PHILOSOPHY,

Consisting of Seven Parts.

- I. The Principles of Mechanicks, and the Force of the Simple and Compound Machines.
- II. The *Galilean* and *Newtonian* Philosophy.
- III. The Laws of Hydrostaticks, or the Effects of the Gravitation of Fluids.
- IV. Pneumatics; or the peculiar Properties of the Air, and the Phænomena depending on its Pressure and Elasticity.
- V. Several Miscellaneous Experiments; being an Explanation of the Engines and Inventions of Use for the Accommodation of Life, and Depending on the Effects of the Mechanical, Hydrostatical, and Pneumatical Principles, with the Engines themselves, or Draughts or Models, proper to the Occasion.
- VI. Opticks, Explaining the Nature of Vision, of Reflecting and Refracting Glasses, and of Light and Colours, according to Sir *ISAAC NEWTON*'s Theory.
- VII. Astronomy; or the System of the Universe more particularly Explain'd.

N. B. These Courses will be Perform'd over the *Bedford* Coffee-House *Covent-Garden*, and at the Academy in *Tower-Street*. By Mr. *James Stirling*, F. R. S. Mr. *Peter Brown*, Mr. *William Watts*, and Mr. *William Deam*, Mathematical Instrument-Maker, and by whom the principal Instruments of the Apparatus were made.

To begin over the *Bedford* Coffee-House *Covent-Garden*.
To begin at the Academy *Tower-Street*.

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THE Design in this Course is to Demonstrate those Things by Experiments that have been found out by Geometrical Reasonings, which may be useful to, such as are acquainted with Mathematicks, but will be more particularly so to those who are not acquainted therewith, it being very possible this way to give a good Idea of those new Discoveries in Nature (which have so much taken up the Attention of the Learned) to such as are unskill'd in Mathematicks, by which they may come to the Knowledge of many Things which cannot be attain'd any other way, without much Study and Application; but those who are desirous to enquire into the Mathematical Demonstrations, may have Satisfaction therein at proper Hours, and be Taught any Parts of Mathematicks at their own Apartments, by Mr. Stirling, or at the Academy in Tower-Street, by Mr. Brown, &c.

The Charge of going this Course is three Guineas, the Days, Mondays, Wednesdays and Fridays: But any Number not exceeding Twelve, and paying for Twelve, may go through the same in private, at their own Hours.

CATALOGUES are to be had at the Places of Performing, and at Messieurs *Woodman's* and *Lyons, Covent-Garden.*

Of



Of the Methods used by the Antient and Modern Philosophers in explaining Phænomena, and making Discoveries in Nature.

The METHOD of REASONING used in this Course.

Mechanicks.

THE Universal Properties of Matter.

Of the Divisibility of Matter.

Of a Vacuum. Experiments to prove a Vacuum.

Of Motion, Place and Time.

Experiments to distinguish Motion from Velocity.

Of Gravitation in general.

Of Absolute and Relative Gravity.

Experiments to explain the Nature of, and to find the Center of Gravity, in all Bodies; and to distinguish it from the Center of Magnitude.

An Experiment making the same Body roll up and down an Ascent by the Force of Gravity.

A heavy Body, which of it self would fall from a Table, hinder'd from falling, by adding a heavier Body to it.

Of Friction.

The Center of Gravity explain'd by the Falling, Sliding and Rolling of Bodies, on an Inclined Plain.

Experiments concerning the Distance and Line of Direction of a Weight and Power.

Experiments to shew the Mystery and Feats done by *Sampsons* and strong Men.

Of the Mechanical Powers.

OF Balances, which are either Scales or Steel Yards.

Of false Scales, and the way to discover them.

Of the several kinds of Levers.

Of Pullies Single and Combin'd.

Of the Wheel and Axle.

Of the Inclined Plane.

Of the Wedge.

Of the Screw.

A new and curious Engine compounded of all the Mechanical Powers.

Of

Of the Galilean Philosophy.

EXperiments to prove Sir *Isaac Newton's* three Laws of Motion, on which all his Philosophy is founded.

Of the Composition and Resolution of Forces.

Experiments to shew that the Composition of Forces in different, but not contrary, Directions, produces a new Direction in a Diagonal Line.

Galileo's Hypothesis of Gravity explain'd.

Of the Perpendicular Ascent and Descent of Bodies.

An Experiment to prove that the Velocity of a falling Body is proportional to the Time in which it falls, and that the Spaces it goes through are proportional to the Square of the Times.

An Experiment to shew that the Ascent or Descent of a Body is the same, whether the Place wherein it moves be at rest, or in an uniform Motion.

Objections against the Motion of the Earth answer'd from this Experiment.

Experiments concerning the Descent of Bodies on Inclined Plains.

An Introduction to the Theory of Pendulums.

The Center of Oscillation and Percussion explain'd.

How a Pendulum regulates the Motion of a Clock.

An Experiment to shew the Influence of Heat and Cold on Pendulums.

The Oscillation of Pendulums shorter or longer, as the Force of Gravity is greater or less.

The Doctrine of Projectiles explain'd.

An Experiment to shew that Projectiles move in a Parabola.

The Art of Gunnery explain'd.

Experiments to explain the Foundation of the Art of Gunnery.

Of the Newtonian Philosophy.

OF the Centripetal and Centrifugal Forces.

Gravity is not uniform, as *Galileo* suppos'd it.

The Law of Gravity, according to Sir *Isaac Newton*.

All Bodies revolving about a Center are acted on by a Centripetal Force, else they would run out in Strait Lines.

The same prov'd by several curious Experiments in solid and fluid Bodies.

These Principles prov'd from the System of the Universe.

The Moon, while it revolves about the Earth, is kept in its Orbit by the Force of Gravity.

The Planets and Comets are kept in their Orbits by their Gravitation towards the Sun.

The Satellites of Jupiter and Saturn are kept in their Orbits by their Gravitation towards their Primary Planets.

All Bodies gravitate towards one another.

Of the Congress of Bodies, and the Communication of Motion.

Of the tremulous Motion of Sounding Bodies.

Experiments to shew the Law of Vibration of a Musick String.

Of the Cohesion of the Parts of Bodies.

Several Experiments to prove the Attraction of the Particles of Bodies.

Experiments to shew Electrical Attraction and Repulsion.

Experiments relating to the several Phosphori.

The Light of Phosphorus diminish'd in compress'd Air, and augmented in Vacuo.

Several curious Experiments with the Loadstone.

Hydrostaticks.

OF Fluids in general.

Experiments to shew, That Fluids of the same Kind gravitate upon each other.

— That those of different Kinds gravitate upon each other.

— That Fluids press in all manner of Directions at the same Time.

— That the force of that pressure is proportionable to the particular Height of the Fluid in all Parts of the containing Vessel.

— That any given Quantity of Water tho' never so small, may be made to press with a Force equal to any given Weight, tho' never so great.

— That any given Weight may be rais'd by the Force of a Mans Lungs, by blowing thro' a Tube, proportionably small.

Several

Several other Experiments to explain what is call'd the Hydrostatical Paradox.

Experiments to shew how high, and why Water will rise in Fountains and oblique Jets, and the best way of making spouting Pipes.

The Expence of Water spouting from small equal Holes, at any given Distance from the Surface, computed, and shewn to be as the square Roots of those Distances.

Experiments to shew that Bodies heavier than Water, when weigh'd in Water, lose as much of their Weight as is equal to that of so much Water, and that Bodies lighter than Water will so Swim in it, that a Quantity of Water equal in Bulk to the Part immers'd, will be equal in Weight to the whole Body.

— That on these Principles, Lead or any Metal may be made to Swim in Water, and even be rais'd up by it.

— That a Body Lighter than a Fluid will be kept down, and even depress'd by it.

Pneumatics.

Experiments concerning the Nature of the Air in general.

— That the Density and Spring of the Air is as the Force that compresses it.

— That the Pressure of the Air decreases, according to its Distance from the Surface of the Earth.

How to find what Quantity of Air presses upon our Bodies at any Time.

The

The Rising and Falling of the Quicksilver in the Weather Glass, explain'd and accounted for.

The different Sorts of Barometers.

Of Thermometers and Hygrometers of several Kinds.

Of the Effect of High Winds on the Barometer.

The Air Pump and manner of its Working explain'd.

Experiments which directly prove the Weight, and Spring of the Air, *viz.*

— By the Sense of Feeling, — breaking Glass-Vials, — the Phænomena of Bladders, Glass Bubbles, &c.

— By Fountains and Barometers, dropping asunder of Polish'd Marbles, and the raising great Weights in Vacuo.

— By the famous Experiments with the Hemispheres.

The surprizing Motion of several Sorts of Liquors in Vacuo.

Experiments with the Condensing Engine.

Experiments to prove that Sound can't be convey'd without Air, and that 'tis diminish'd or increas'd, according as the Air is rarify'd or condens'd.

— That Fire and Flame are fed by Air.

— That Gunpowder is fir'd in Vacuo without any Explosion.

Experiments to shew the Effects of rarify'd, condens'd and burnt Air upon the Life of Animals.

The force of rarify'd Vapour in raising Water by Fire, &c.

With several other curious Experiments on the Air-Pump.

Miscellaneous

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CRanes and Contrivances for Raifing great Weights.
How Men or Horfes may be made to carry Burthens in Proportion to their Strength.

The proper Manner of Loading Carriages, with the Advantages of great or small Wheels, according to the different Circumstances of Draught.

Wind and Water Mills Explain'd.

Sailing, Flying and Swimming accounted for.

Cranes or Syphons for emptying Veffels, Sucking, Forcing, and Lifting Pumps.

The feveral other Kinds of Pumps.

The Hydrometer, or Water Poife.

The Hydroftatical Ballance to determine the fpecific Gravity of all Solids and Fluids.

Cupping Instruments.

Diving Engines.

A Wind Gun.

The feveral Kinds of Engines for Raifing Water for fupplying Houfes and Refervoirs, or Emptying Ponds or Mines.

The feveral Kinds of Engines for Extinguifhing of Fires.

The famous Engine for Raifing Water by Fire Explain'd.

A Machine us'd in *Holland* and *Venice*, to carry
Ships from their Docks to the Sea.

With several other curious Contrivances, &c.

Opticks.

OF the Nature and Motion of Light.
Of Vision in general.

How a Picture is the Representation of Objects.

Experiments proving this great Principle of Catop-
tricks—— That when the Rays of Light are re-
flected, the Angle of Incidence is equal to that of
Reflection.

Of Plane Mirrors.

The several Reflections from the two Surfaces of
Looking-Glasses consider'd.

Of Concave and Convex Mirrors.

Of Concave and Convex Cylindrick Mirrors.

A Picture, Optically deform'd, seen in just Propor-
tion, by Reflection from a Cylindrick Mirror.

Experiments to prove the Law of Refraction.

Multiplying Glasses.

Experiments to shew the Nature of Convex and Con-
cave Glasses, and the manner of the Rays of
Light passing through them, and uniting in their
Focus's.

How to find the Focus of a Lens, and whether it be
truly Center'd.

Water

Water made to burn, by collecting the Sun's Rays
into a Focus.

The Camera Obscura.

The Magick Lanthorn.

The Dissection of the Eye.

An Artificial Eye, representing all the Coats and Humours.

The Faults of Vision shew'd by an Instrument.

Experiments, to shew how the short sighted and old
Eyes may be helped.

The Difference between Looking and Seeing.

The Nature and Use of Microscopes and Telescopes.

The Circulation of the Blood.

Sir Isaac Newton's Theory of Light and Colours prov'd
by Experiments.

Experiments to shew the Cause of the Rainbow.

Astronomy.

THE System of the Universe more particularly
explain'd, as to the Magnitudes, Distances and
Revolutions of the Heavenly Bodies.

The Annual and Diurnal Motions of the Earth, from
whence is shewn the Cause of Day and Night,
and the different Seasons.

A curious Experiment, to prove the Figure of the
Earth, from its Diurnal Motion,

The same confirm'd by Pendulums,

Of the Moon and its Phases.

The Tides and Flux and Reflux of the Sea accounted for.

Of Eclipses.

Of the manner of using Telescopes and Astronomical Instruments for making Observations.

A curious Reflecting Telescope.

F I N I S.



Advertisement.

AT the Academy in *Little-Tower-Street* is to be learn'd every Qualification necessary for Business or Accomplishment, after a peculiar and approved Method, there being retained several Professors capable to answer for their respective Trusts; to teach Writing, Arithmetick and Merchants Accounts, all Parts of Mathematicks, and to give Courses of Experimental Philosophy, also the Classics and modern Languages; and to Foreigners and others not well informed therein, the *English* Language, Drawing, Dancing, &c. There are also proper Accommodations for Boarding, and those that do not Board may be Taught either in publick or private, the Pupils being under proper Regulations, and the whole Education so calculated as to answer the Ends of those whose Fortunes are not abounding, as well as of the Rich, the Charge increasing only with the Number of Qualifications to be attain'd, as may be seen at large in the Account of the Conditions and Terms, to be had at the said Academy. Letters are directed to Mess. *Tho.* and *W. Watts*: And from this Academy Noblemen, Gentlemen and Merchants may be always likely to be supply'd with Stewards, Clerks, or Book-keepers duly qualify'd and capable to give Security for their Fidelity.

